AGRONOMICAL PERFORMANCE OF COMMON BEAN CROPPED UNDER AGROECOLOGICAL MANAGEMENT SYSTEM

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INTRODUCTION

Common bean (*Phaseolus vulgaris* L.) plays key social and economic roles on the Brazilian society, since it is an important source of protein for the poorer population (SILVA and DEL PELOSO, 2006). On common bean cropping, green manures may reduce or eliminate the use of N fertilizers, ensuring the conservation of the natural resources and reducing production costs. Besides, the use of green manure associated to conservative management practices increase soil organic matter, which contribute to a more sustainable agriculture.

MATERIALS AND METHODS

Aiming to evaluate the effect of soil management and cover crops on common bean, a field experiment was carried out at the National Rice and Beans Research Center of Embrapa, located in the county of Santo Antônio de Goiás, Goiás, Brazil. Common bean was cropped after Sunn hemp (*Crotalaria junceai)*, Velvet bean (*Mucuna aterrima*), Pigeon pea (*Cajanus cajan*), Sorghum (*Sorghum bicolor* L.) and Fallow (spontaneous plants) under conventional tillage (CT) and no-tillage (NT) management. Three common bean plants were randomly collected per plot at the V4 stage. To determine the number of nodules (NN) they were separated from the roots and counted. Thus, nodules were cut to determinate the percentage of active nodules (%AN) with basis on the presence of leghemoglobin. Stem fresh (SFW) and dry weight (SDW), leaf fresh (LFW) and dry weight (LDW) and the leaf area index (LAI) were also evaluated by determining the fresh and dry mass of the aerial plant parts and, grain yield (GY) was determined at 13% of humidity.

RESULTS AND DISCUSSION

Soil management systems showed significant effect on the NN, %AN, SDW and GY, although it had not been observed effect of the cover crops for SFW and GY. For the NN and %AN significant effects of the cover crops were only observed within NT, in which Velvet bean showed greater NN than Pigeon pea and, greater %AN than pigeon pea and Sorghum (Table 1). There were observed many significant correlations among the agronomical attributes of common bean, however, GY was only affected by NN and %AN (Table 2). These results partially corroborate the findings of CARVALHO and AMABILE (2006), in which any factor affecting plant growth will influence the biological nitrogen fixation, and vice versa since the association is a symbiotic system in which both partners are interdependent. Although many reports have been shown a positive correlation between nodules mass and fixed N, great number of nodules will not necessarily result in great amounts of fixed N and grain yield (CARVALHO, 2002).

Table 1: Number of nodules (NN – nº plant^{-1}), percentage of active nodules (%AN), stem fresh weight (SFW – g plant^{-1}), stem dry weight (SDW - g plant^{-1}), leaf fresh weight (LFW - g plant^{-1}), leaf dry weight (LDW - g plant^{-1}), leaf area index (LAI – m^2 m^{-2}) and grain yield (GY – ton ha^{-1}) of common bean cropped under different cover crops and soil management systems.

Soil management	Cover crops	NN	%AN	SFW	SDW	LAI	LFW	LDW	GY
CT	Sunn hemp	17.8 a	10.75 a	6.06 a	0.54 a	2.44 a	9.89 a	1.33 a	1.40 a
	Pigeon pea	4,3 a	6.25 a	6.69 a	0.56 a	2.81 a	11.30 a	1.45 a	1.48 a
	Velvet bean	15.8 a	10.00 a	7.73 a	0.60 a	3.38 a	13.64 a	1.72 a	1.82 a
	Sorghum	17 a	7.50 a	6.17 a	0.54 a	2.78 a	10.68 a	1.39 a	1.51 a
	Fallow	18.5 a	2.50 a	8.77 a	0.80 a	3.66 a	14.88 a	2.05 a	1.45 a
	Mean	14.7 B	7.40 B	7.08 A	0.61 B	3.01 A	12.07 A	1.58 A	1.53 B
NT	Sunn hemp	56.3 ab	47.50 ab	7.72 a	0.81 a	3.40 a	12.82 a	1.86 a	1.94 a
	Pigeon pea	24.5 b	17.00 b	6.64 a	0.68 a	2.88 a	10.32 a	1.47 a	1.96 a
	Velvet bean	71.3 a	57.50 a	9.23 a	0.96 a	3.41 a	14.80 a	2.11 a	2.07 a
	Sorghum	33 ab	17.50 b	7.36 a	0.72 a	3.16 a	12.58 a	1.81 a	2.09 a
	Fallow	49.8 ab	40.00 ab	6.62 a	0.61 a	2.76 a	10.10 a	1.34 a	2.07 a
	Mean	47 A	35.90 A	7.51 A	0.75 A	3.13 A	12.12 A	1.71 A	2.03 A

Values in the column, within soil management, followed by the same lower case letters and, mean of soil management followed by the same upper case letters, are not different by the Scott-Knott test ($p<0.05$).

Table 2: Pearson correlation coefficients among agronomical attributes of common bean cropped under different cover crops and soil management systems.

	NN	%AN	SFW	SDW	LFW	LDW	LAI	GY
NN	1							
%AN	0.97**	1						
SFW	0.50^{ns}	0.40^{ns}	1					
SDW	0.74*	0.65*	0.88**	1				
LFW	0.31^{ns}	0.21^{ns}	0.95**	0.75*	1			
LDW	0.47^{ns}	0.35^{ns}	0.96**	0.89**	0.95**	1		
LAI	0.33^{ns}	0.23^{ns}	0.90**	0.75*	0.94**	0.92**	1	
GY	0.74*	0.72*	0.29^{ns}	0.49^{ns}	0.15^{ns}	0.28^{ns}	0.26^{ns}	1

** - significant correlation ($p<0.01$); * - significant correlation ($p<0.05$); ^{ns} – non significant correlation.

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